AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1. (Original) In a measurement system comprising a transducer, a feedback amplifier coupled to the transducer and a signal processing circuit coupled to an output of the amplifier, a method of testing the transducer in-situ comprising:

   a. coupling a test signal to the transducer;
   b. disabling the charge amplifier; and
   c. analyzing the response of the transducer to the test signal with the signal processing circuit.

2. (Original) The method of Claim 1 further comprising coupling an analyzer to an output of the amplifier and measuring the response of the transducer.

3. (Original) The method of Claim 1 further comprising coupling impedance between the signal source and the amplifier.

4. (Original) The method of Claim 3 further comprising small value capacitor as the impedance.

5. (Original) The method of Claim 1 further comprising coupling the signal source generating a test signal to a resistor and on to an output of the amplifier.

6. (Original) The method of Claim 1 further comprising comparing a measured response of the transducer to a signature response.

7. (Currently Amended) The method of ~~Claim 8~~ Claim 1 wherein the signature response comprises a measured response of an unmounted transducer.

8. (Currently Amended) The method of ~~Claim 8~~ Claim 1 wherein the signature response comprises a measured response of a mounted transducer to a test signal prior to initiating operations with the transducer.

9. (Original) The method of Claim 8 wherein the signature response of claim 10 further comprises a measured response of an unmounted transducer.

10. (Currently Amended) The method of ~~Claim 11~~ Claim 8 wherein the measured response is characterized by one or more specific amplitudes and/or frequencies.

11. (Currently Amended) The method of ~~Claim 12~~ Claim 10 further comprising generating an error signal whereby the amplitude and/or frequency of the signature response falls outside a predetermined range.

12. (Currently Amended) The method of Claim 1 further comprising coupling the signal source for generating a test signal to an output of the amplifier at a connection to the amplifier ~~feed back~~ feedback.

13. (Original) The method of Claim 1 further comprising coupling the signal source generating a test signal between an output of the transducer and an input to the amplifier.

14. (Original) The method of Claim 1 in which the test signal has an amplitude approximating the maximum allowed by the test circuit.

15. (Original) The method of Claim 1 in which the measured response is normalized for various conditions comprising environmental conditions.

16. (Currently Amended) A self-testing piezoelectric transducer circuit comprising:

a. a piezoelectric transducer;

b. an amplifier, comprising a feedback circuit, coupled to the transducer, amplifying the output of the transducer;

c. a power source coupled to the amplifier;

d. a signal source generating a test signal, having a frequency spectrum at least overlapping the [[self-]] natural resonant frequency of the transducer, coupled to the transducer; and

e. switch coupled between the power source and the amplifier and between the signal source and the transducer for disabling the amplifier and coupling the signal source to the transducer to make a test.

17. (Original) The transducer circuit of claim 16 further comprising an analyzer connected to an output of the amplifier for measuring the response of the transducer to the test signal.

18. (Original) The transducer circuit of Claim 16 further comprising an impedance coupled between the signal source and the amplifier.

19. (Original) The transducer circuit of Claim 16 further comprising small value capacitor as the impedance.

20. (Currently Amended) The transducer circuit of Claim 16 wherein the signal source generating a test signal is further coupled to an output of the amplifier at a connection to the amplifier ~~feed back~~ feedback.

21. (Original) The transducer circuit of Claim 16 wherein the signal source generating a test signal is further coupled between an output of the transducer and an input to the amplifier.

22. (Original) The transducer circuit of Claim 16 wherein the signal source generating a test signal is further coupled to an output of the amplifier through a resistor.

23. (Currently Amended) The transducer circuit of Claim 16 in which the signal source generating the test signal frequency spectrum overlapping the [[self-]] <u>natural</u> resonant frequency of the transducer further comprises generating a swept frequency test signal.

24. (Currently Amended) The transducer circuit of Claim 16 in which the signal source generating the test signal frequency spectrum overlapping the [[self-]] <u>natural</u> resonant frequency of the transducer further comprises generating one or more of a white noise test signal, a swept frequency test signal, a pseudorandom noise, a periodic chirp, a sinusoidal signal, and a step function.

25. (Original) In a measurement system comprising a transducer, an amplifier comprising a feedback loop coupled to the transducer and a signal processing circuit coupled to an input of the amplifier, a method of testing the transducer in-situ comprising:

a. coupling a test signal to the transducer;

b. disabling the charge amplifier; and

c. analyzing the response of the transducer to the test signal with the signal processing circuit.

26. (Original) A self-testing piezoelectric transducer circuit comprising:

a. a piezoelectric transducer;

b. an amplifier, comprising a feedback circuit, coupled to the transducer, amplifying the output of the transducer;

c. a power source coupled to the amplifier for powering the amplifier;

d. a signal source coupled to the transducer for generating a test signal; and

e. a switch coupled to the amplifier capable of disabling the amplifier.

27. (Original) The transducer circuit of claim 26 where the switch is coupled between the power source and the amplifier.

28. (Original) The transducer circuit of claim 26 where the switch is coupled to the amplifier output.

29. (Original) The transducer circuit of claim 26 where the amplifier is a charge amplifier.

30. (Currently Amended) The transducer <u>circuit</u> of claim 26 where the amplifier is a voltage amplifier and further comprises an impedance coupled parallel to the voltage mode amplifier input.

31. (Original) The transducer circuit of claim 26 further comprising an analyzer connected to an output of the amplifier for measuring the response of the transducer to the test signal.

32. (Original) The transducer circuit of Claim 26 further comprising an impedance coupled between the signal source and the amplifier.

33. (Original) The transducer circuit of Claim 26 further comprising a capacitor as the impedance.

34. (Currently Amended) The transducer circuit of Claim 26 wherein the signal source generating a test signal is further coupled to an output of the amplifier at a connection to the amplifier ~~feed back~~ feedback.

35. (Original) The transducer circuit of Claim 26 wherein the signal source generating a test signal is further coupled between an output of the transducer and an input to the amplifier.

36. (Original) In a measurement system comprising a transducer, a feedback amplifier coupled to the transducer and a signal processing circuit coupled to an output of the amplifier, a method of testing the transducer in-situ comprising:

a. coupling a test signal to the transducer;

b. disabling the charge amplifier;

c. analyzing the response of the transducer to the test signal with the signal processing circuit; and

d. comparing a measured response of the transducer to a signature response wherein the signature response comprises a measured response of an unmounted transducer.

37. (Currently Amended) The method of claim 36 wherein the measured response of an analog output transducer with built-in test whose output is programmed to assume a predetermined value when an unacceptable fault condition is detected. (Preferred embodiment: [[A]] a 4 - 20 mA transmitter may be programmed to provide a constant output such as 4 or 20 mA upon fault detection. Or, in order to more conclusively identify that the output is due to self-test results, the transducer may be programmed to alternate values in a predetermined pattern such as alternating once per second between one of the extreme values 4 or 20 mA and the current output of the transducer. The same could apply to analog voltage or frequency output transducers.)

38. (Currently Amended) The method of claim 36 wherein the measured response of an analog output transducer with built-in test whose output is modulated with a signal reflecting the results of a detected fault condition. (Preferred embodiment: [[A]] a 4 - 20 mA transmitter may have a method by which its output signal or power line

may be modulated by a signal to initiate and communicated the status of an internal self-test function. This requires the addition of an interface at the signal's receiving and compatible with this communication method. The modulated signal my be voltage or current bias, a fixed or varying frequency, or a modulated pulse train.

39. (Original) The method of claim 36 wherein the measured response of an analog output transducer with built-in test that provides an additional interface for communication of test results. (Preferred embodiment: a 4 - 20 mA transmitter may include an LCD and key pad interface that can be used to initiate and communicate the results of testing in digital or human readable form. Alternatively, the additional interface might be connector or wireless interface that uses a digital communication protocol.)

40. (Currently Amended) The method of claim 36 wherein the measured response of an analog output transducer with built-in test that uses the results [[or]] of the test to appropriately compensate its analog output signal. (Preferred embodiment: ~~A 4 - 200 mA~~ a 4 - 20 mA transmitter may include a compensation algorithm to the sensor output when self-test indicates a fault condition. An example would be to multiply the analog output sensor signal by 1.05 when a 5% reduction in sensitivity is detected. This method may be used in combination with the

previous claims when a fault condition or severity is detected that an internal algorithm can no longer adequately compensate.